

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP130

Programmable Controllers

AC / DC-Input Module

Telecommunication

The TOSHIBA mini flat coupler TLP130 is a small outline coupler, suitable for surface mount assembly.

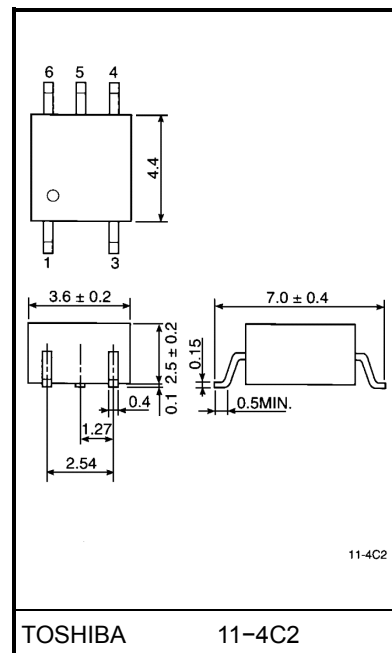
TLP130 consists of a photo transistor, optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel, and operate directly by AC input current.

- Collector-emitter voltage: 80V(min.)
- Current transfer ratio: 50%(min.)
Rank GB: 100%(min.)
- Isolation voltage: 3750Vrms(min.)
- UL recognized: UL1577, file no.E67349
- Current transfer ratio

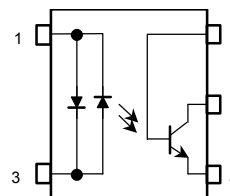
Classi- fication	Current Transfer Ratio		Marking Of Classification
	I _F = 5mA, V _{CE} = 5V, T _a = 25°C		
	Min.	Max.	
Standard	50	600	Blank, Y, GR, GB
Rank GB	100	600	GB,GR

(Note) Application type name for certification test,
please use standard product type name, i.e.
TLP130(GB): TLP130

Unit in mm



Weight: 0.09 g



- 1 : Anode, Cathode
- 3 : Cathode, Anode
- 4 : Emitter
- 5 : Collector
- 6 : Base

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	$I_{F(RMS)}$	50	mA
	Forward current derating (Ta≥53°C)	$\Delta I_F / ^\circ C$	-0.7	mA / °C
	Peak forward current (100μs pulse, 100pps)	I_{FP}	1	A
	Junction temperature	T_j	125	°C
Detector	Collector-emitter voltage	V_{CEO}	80	V
	Collector-base voltage	V_{CBO}	80	V
	Emitter-collector voltage	V_{ECO}	7	V
	Emitter-base voltage	V_{EBO}	7	V
	Collector current	I_C	50	mA
	Peak collector current (10ms pulse, 100pps)	I_{CP}	100	mA
	Power dissipation	P_C	150	mW
	Power dissipation derating (Ta≥25°C)	$\Delta P_C / ^\circ C$	-1.5	mW / °C
	Junction temperature	T_j	125	°C
Storage temperature range		T_{stg}	-55~125	°C
Operating temperature range		T_{opr}	-55~100	°C
Lead soldering temperature (10s)		T_{sol}	260	°C
Total package power dissipation		P_T	200	mW
Total package power dissipation derating (Ta≥25°C)		$\Delta P_T / ^\circ C$	-2.0	mW / °C
Isolation voltage (AC, 1min., RH ≤ 60%) (Note 1)		BV_S	3750	Vrms

(Note 1) Device considered a two terminal device: Pins 1 and 3 shorted together and pins 4, 5 and 6 shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	—	5	48	V
Forward current	$I_{F(RMS)}$	—	16	25	mA
Collector current	I_C	—	1	10	mA
Operating temperature	T_{opr}	-25	—	85	°C

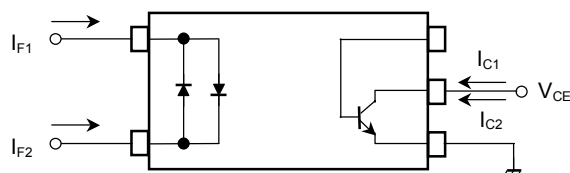
Individual Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	$I_F = \pm 10\text{mA}$	1.0	1.15	1.3	V
	Capacitance	C_T	$V = 0, f = 1\text{MHz}$	—	60	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	80	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 0.1\text{mA}$	80	—	—	V
	Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector dark current	I_{CEO}	$V_{CE} = 48\text{V}$	—	10	100	nA
			$V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$	—	2	50	μA
	Collector dark current	I_{CER}	$V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$ $R_{BE} = 1\text{M}\Omega$	—	0.5	10	μA
	Collector dark current	I_{CBO}	$V_{CB} = 10\text{V}$	—	0.1	—	nA
	DC forward current gain	h_{FE}	$V_{CE} = 5\text{V}, I_C = 0.5\text{mA}$	—	400	—	—
	Capacitance collector to emitter	C_{CE}	$V = 0, f = 1\text{MHz}$	—	10	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	I_C / I_F	$I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_{F(sat)}$	$I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Base photo-current	I_{PB}	$I_F = \pm 5\text{mA}, V_{CB} = 5\text{V}$	—	10	—	μA
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 2.4\text{mA}, I_F = \pm 8\text{mA}$	—	—	0.4	V
		$I_C = 0.2\text{mA}, I_F = \pm 1\text{mA}$	—	0.2	—	
		Rank GB	—	—	0.4	
Off-state collector current	$I_{C(off)}$	$I_F = \pm 0.7\text{mA}, V_{CE} = 48\text{V}$	—	1	10	μA
CTR symmetry	$I_{C(ratio)}$	$I_C(I_F = -5\text{mA}) / I_C(I_F = 5\text{mA})$ (Note 2)	0.33	—	3	—

(Note 2) $I_{C(ratio)} = \frac{I_{C2}(I_F = I_{F2}, V_{CE} = 5\text{V})}{I_{C1}(I_F = I_{F1}, V_{CE} = 5\text{V})}$



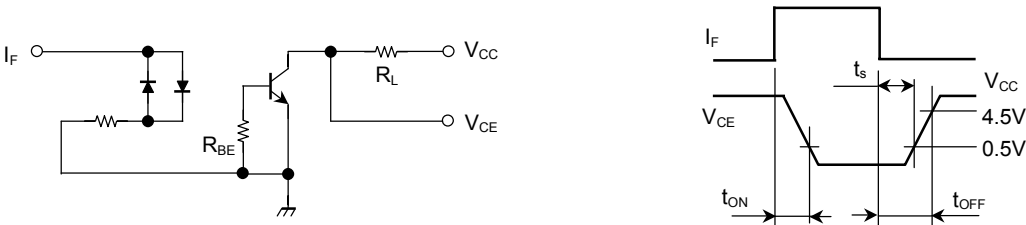
Isolation Characteristics (Ta = 25°C)

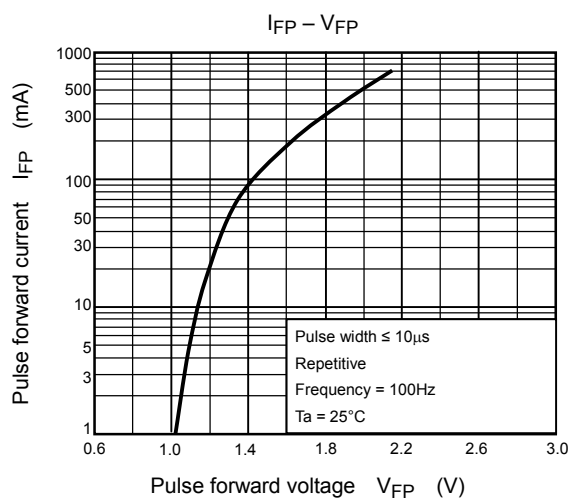
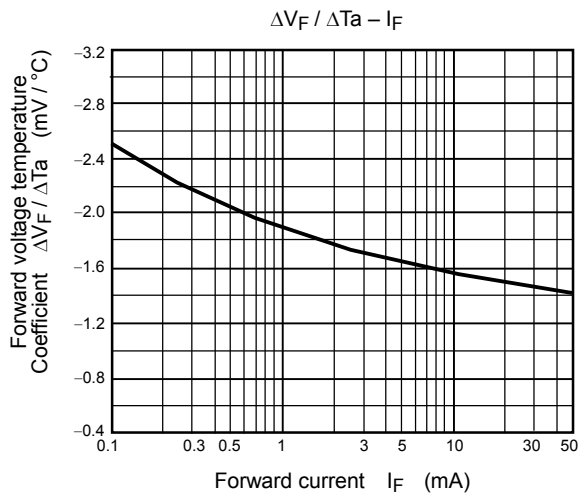
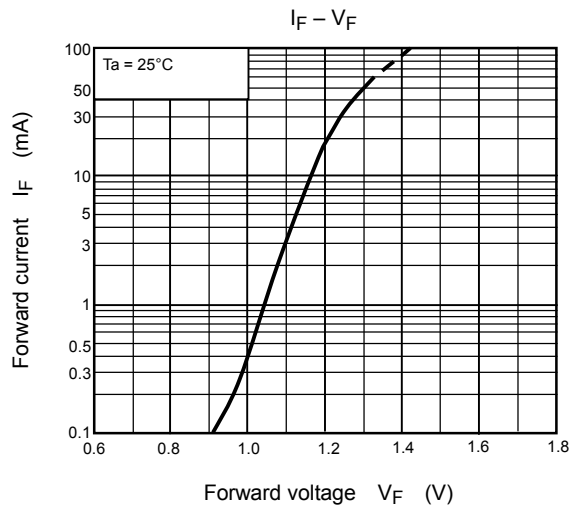
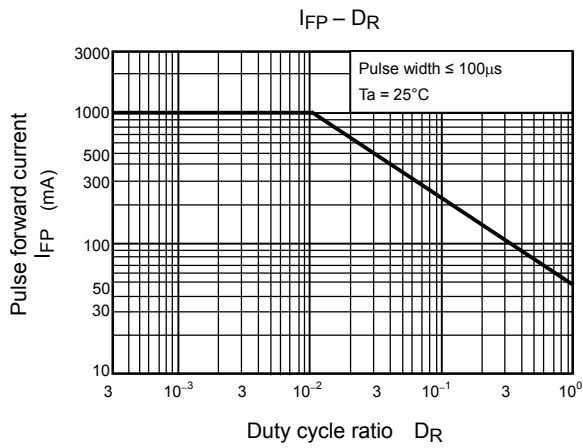
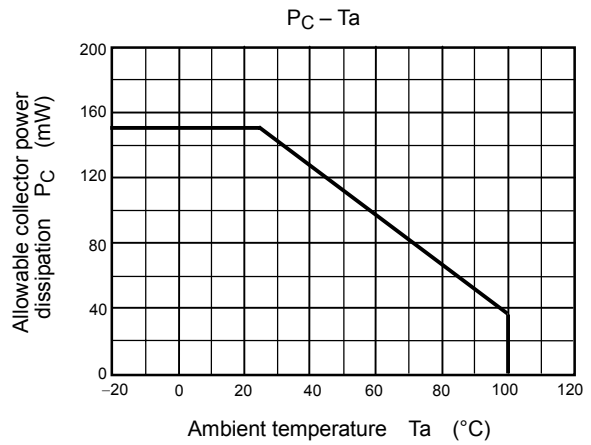
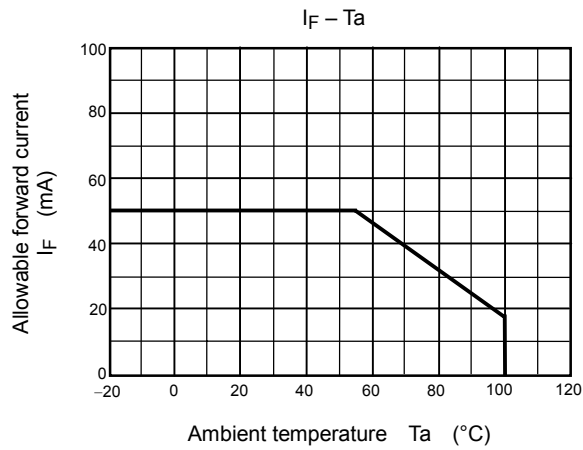
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	CS	VS=0, f=1MHz	—	0.8	—	pF
Isolation resistance	RS	VS=500V	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation voltage	BVS	AC, 1minute	3750	—	—	Vrms
		AC, 1second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

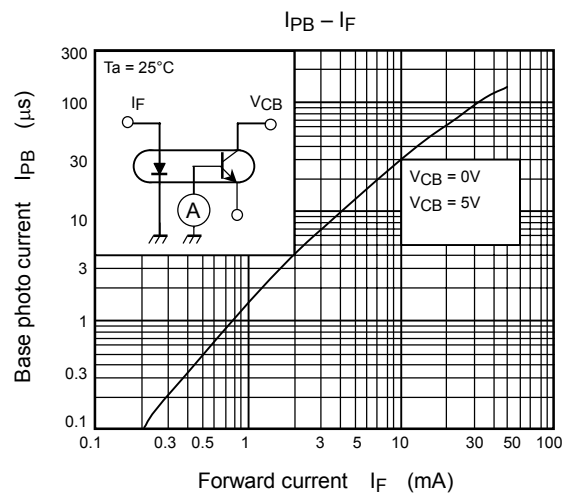
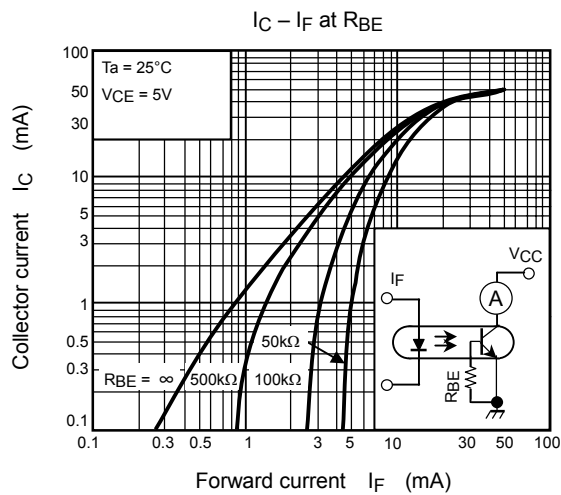
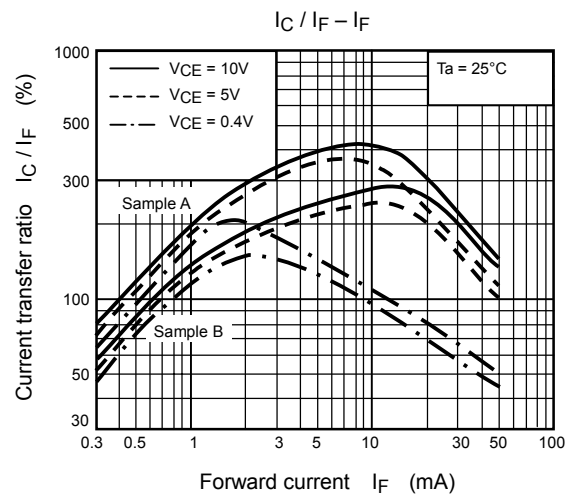
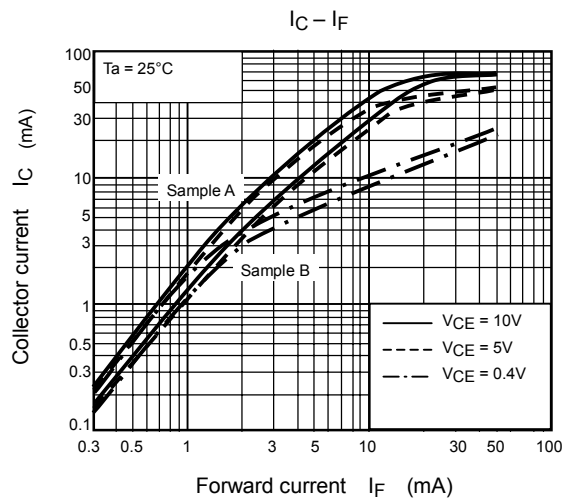
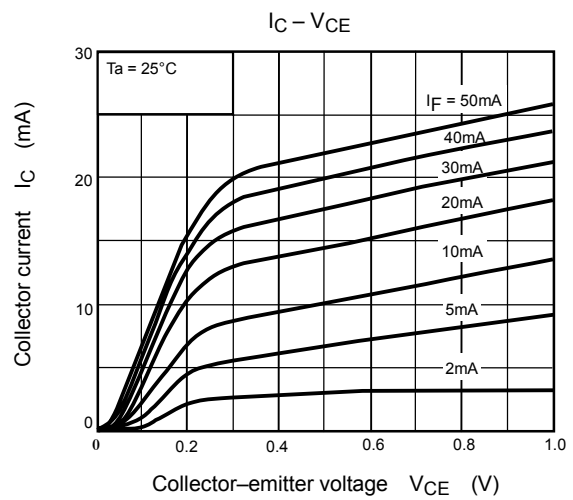
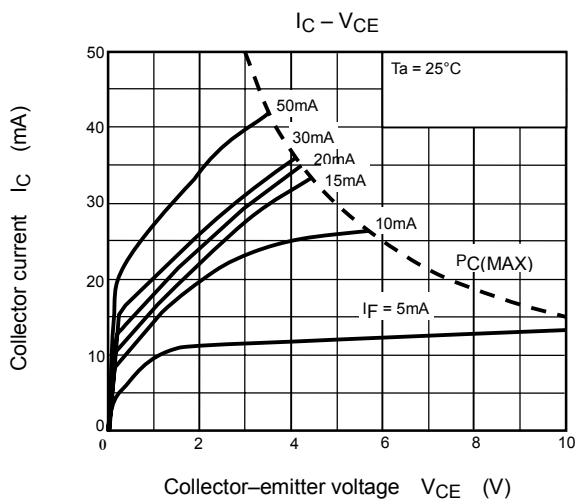
Switching Characteristics (Ta = 25°C)

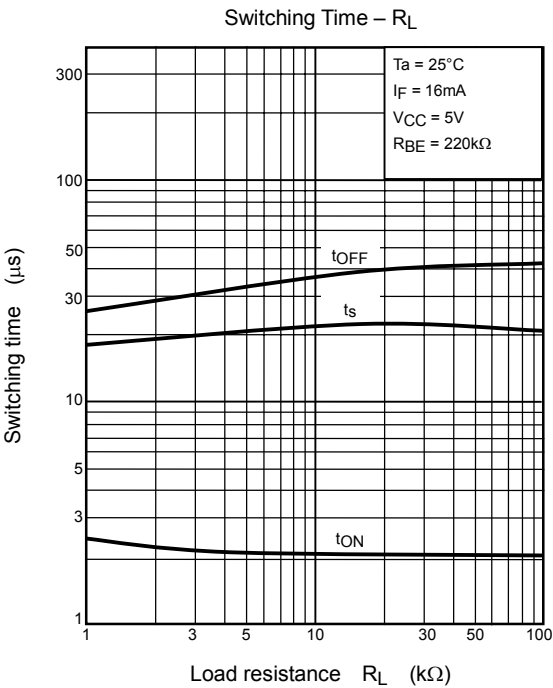
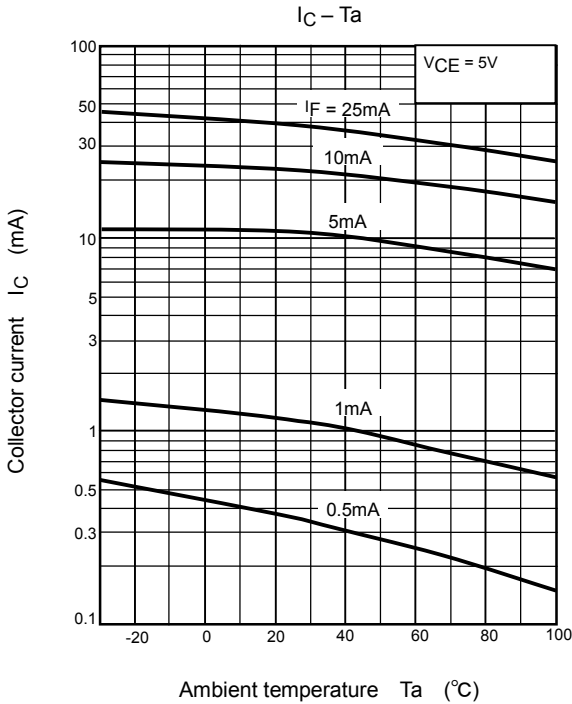
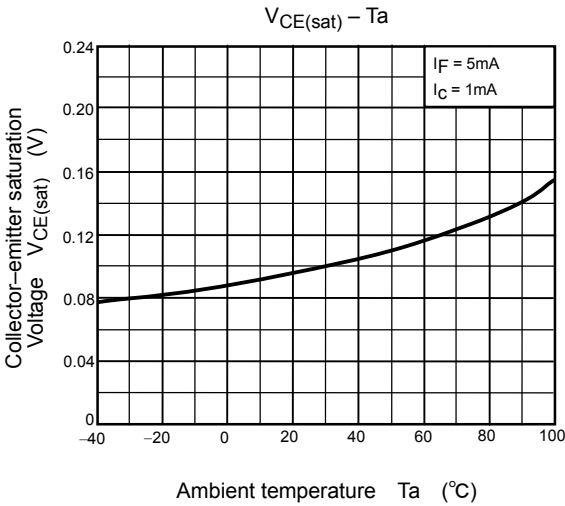
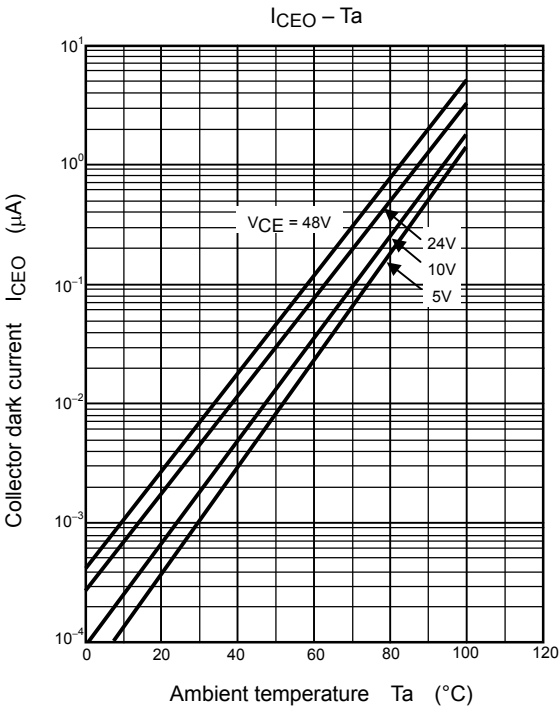
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	tr	VCC = 10V, IC = 2mA RL = 100Ω	—	2	—	μs
Fall time	tf		—	3	—	
Turn-on time	ton		—	3	—	
Turn-off time	toff		—	3	—	
Turn-on time	tON	RL = 1.9 kΩ (Fig.1) RBE = OPEN VCC = 5 V, IF = ±16mA	—	2	—	μs
Storage time	tS		—	25	—	
Turn-off time	tOFF		—	40	—	
Turn-on time	tON	RL = 1.9kΩ (Fig.1) RBE = 220kΩ VCC = 5 V, IF = ±16mA	—	2	—	μs
Storage time	tS		—	20	—	
Turn-off time	tOFF		—	30	—	

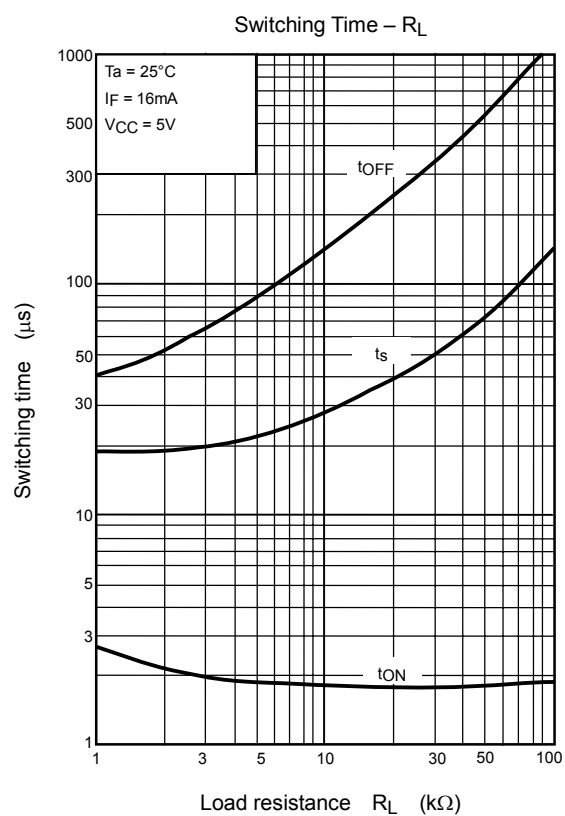
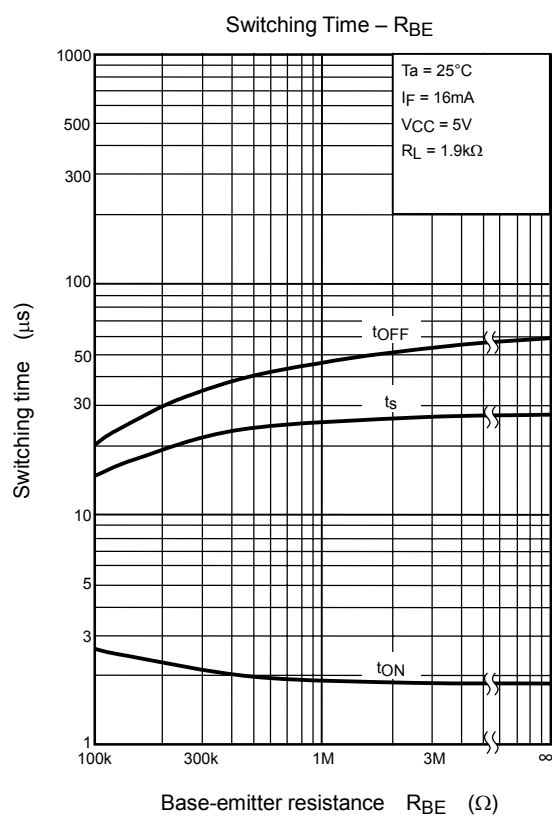
Fig. 1 Switching time test circuit











RESTRICTIONS ON PRODUCT USE

000707EAA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.